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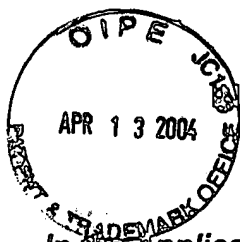
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THE UNITED STATES PATENT AND TRADEMARK OFFICE
Docket No. 12329US03

In the Application of:

ROGER BERNARDS, HECTOR
GONZALEZ, AL KUCERA and
MIKE SCHANHAAR

U.S. Serial No.: 10/028,955

Filed: December 18, 2001

For: METHOD FOR ROUGHENING
COPPER SURFACES FOR
BONDING TO SUBSTRATES

Examiner: S. Ahmed

Group Art Unit: 1765

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on September 15, 2003.

By:

Jonathan R. Sick
Registration No. 43,920
Attorney for Applicant(s)

Commissioner for Patents
Washington, D.C. 20231

DECLARATION UNDER RULE 132

I, Roger Bernards, declare the following:

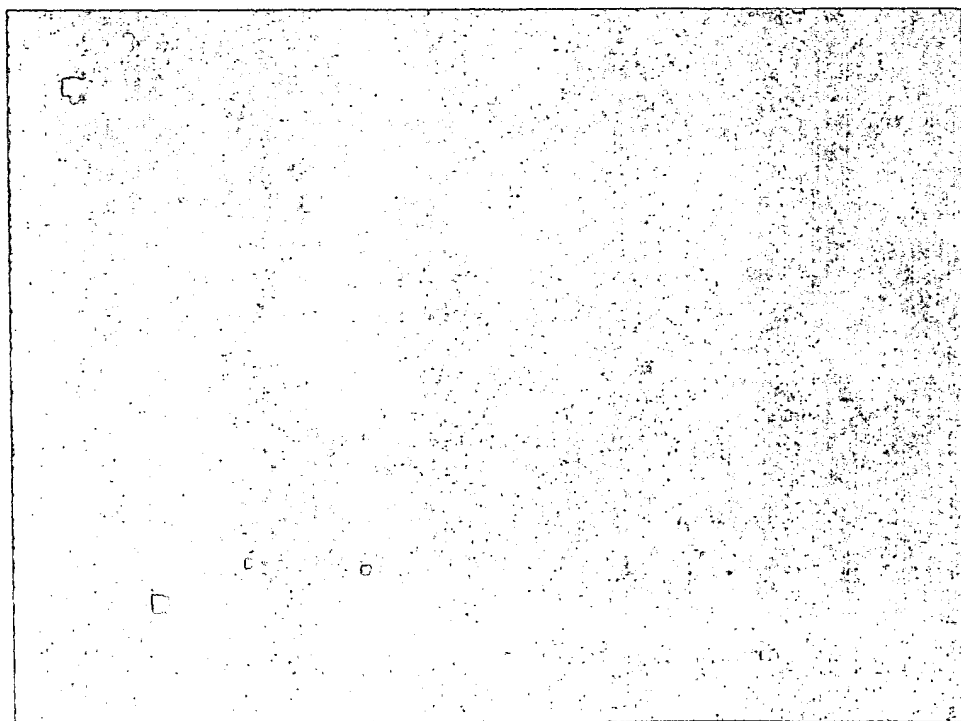
1. I received a Bachelor of Science Degree in Chemistry from the University of Minnesota.
2. I have been employed by Electrochemicals Inc. ("Electrochemicals") since 1997 as a research chemist.
3. I am one of the named inventors listed on the patent application referenced above.
4. Prior to the filing of the patent application referenced above, I conducted several experiments in which I compared an adhesion promoting composition that

contained a tetrazole with an adhesion promoting composition that did not contain a tetrazole. These experiments are described as Examples 1-3 in the patent application.

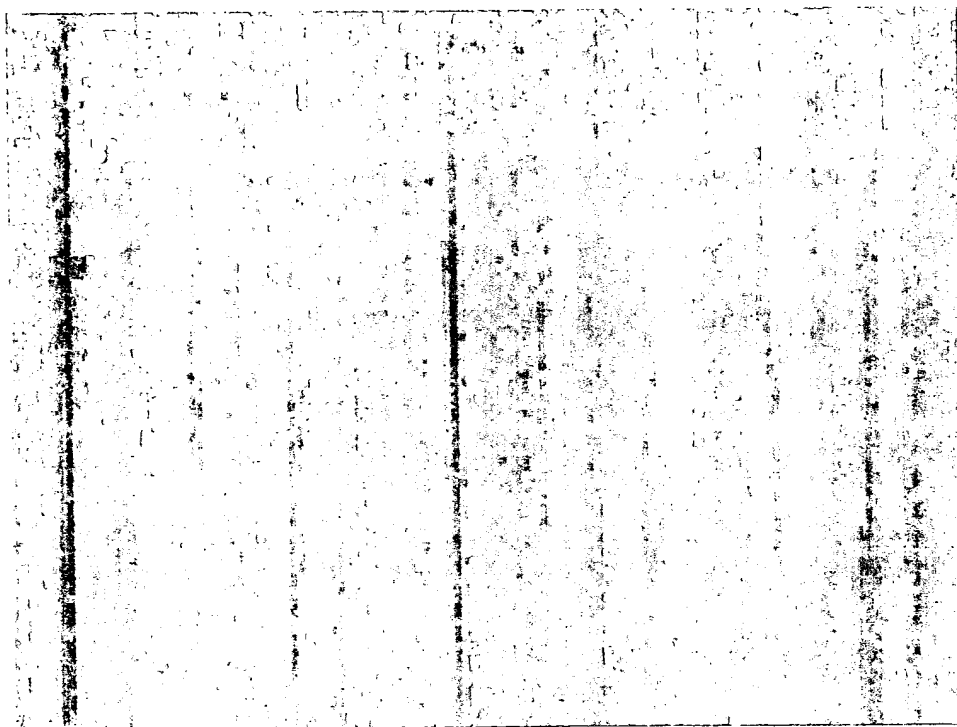
5. In Examples 1 and 2, I used an adhesion promoting composition that did not contain a tetrazole.

6. In Example 1, I applied the following composition to a copper surface: 3% H_2O_2 , 5% H_2SO_4 , 5 g/l benzotriazole ("BTA"), balance deionized water ("DI"). The hydrogen peroxide (H_2O_2) in the composition is an "oxidizer." The sulfuric acid (H_2SO_4) is a "pH adjuster." And the BTA is a "topography modifier."

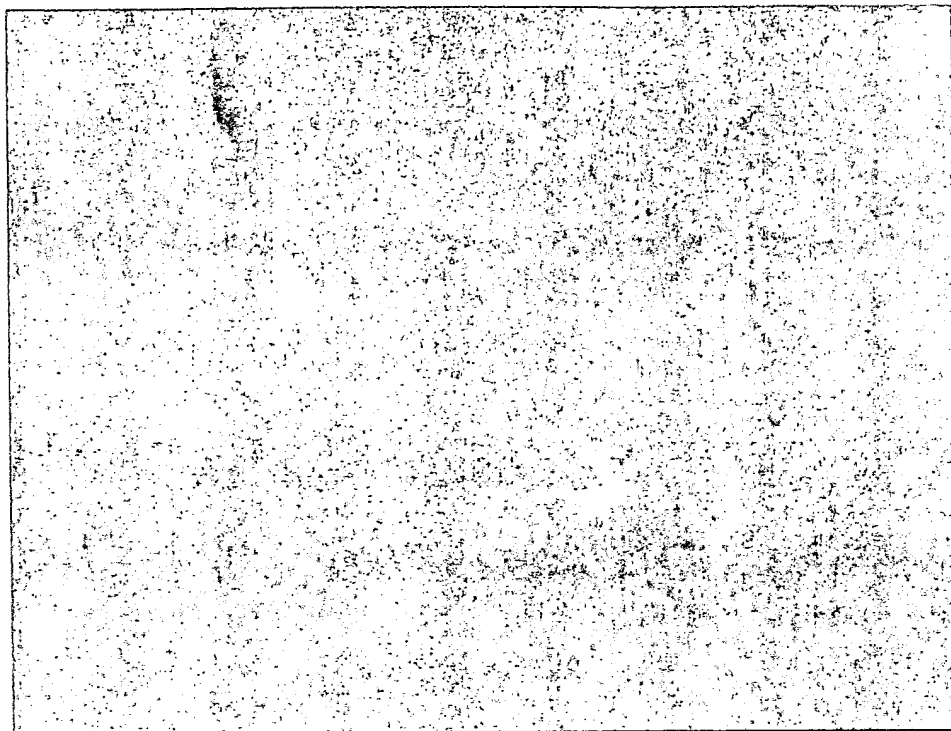
7. The adhesion promoting composition both etched and modified the copper surface. However, the etched surface was undesirably speckled with shiny spots of copper, indicating a non-uniform etch. I took the following magnified photograph of the copper surface of Example 1, which shows the undesirable speckling:



8. In Example 2, I applied the following composition to a copper surface: 3% H_2O_2 , 5% H_2SO_4 , 1.5 g/l BTA, balance DI. The adhesion promoting composition both etched and modified the copper surface. However, the etched surface developed undesirable striations that were indicative of a non-uniform etch. I took the following magnified photograph of the copper surface of Example 2, which shows the undesirable striations:



9. In Example 3, I applied the following composition to a copper surface: 3% H_2O_2 , 5% H_2SO_4 , 1.5 g/l BTA, 0.5 g/l 5-Aminotetrazole, balance DI. As is evident, the composition used in Example 3 contains the tetrazole 5-Aminotetrazole. The tetrazole-containing adhesion promoting composition both etched and modified the copper surface. Unlike Examples 1 and 2 however, the etched surface was desirably uniformly etched. I took the following magnified photograph of the copper surface of Example 3, which shows the desirably uniform surface:



10. I was both surprised and excited by this result. I did not expect that the addition of a tetrazole would lead to a uniformly etched surface. In fact, at the time we filed the application, tetrazoles were not known in the art as compounds which can improve the uniformity of a controlled etch. As a result of our discovery, we called the tetrazole component of our adhesion promoting composition a "uniformity enhancer."

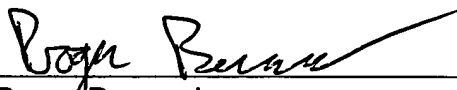
11. In conclusion, I discovered during the course of my experimentation that the particular combination of an oxidizer, a pH adjuster, a topography modifier (a five membered aromatic fused N-heterocyclic ring compound with at least one nitrogen atom in the N-heterocyclic ring, where at least one of the nitrogen atoms in the heterocyclic ring is bonded directly to a hydrogen atom), *and a tetrazole* (the uniformity enhancer) leads to the unexpected and beneficial result of a uniformly etched surface.

12. Prior to the filing of the patent application referenced above, I also conducted the experiments which are described as Examples 5 and 6 in the patent

application. In Example 5, the copper surface was a darker color than the surfaces of Examples 3 and 4, but the surface was still desirably uniformly etched. In Example 6, the surface was somewhat lighter in color, but it was also desirably uniformly etched. To summarize, then, the treated copper surfaces of Examples 5 and 6 showed no defect.

I certify that all statements made herein of my own knowledge are true, and that all statements made herein on information and belief I believe to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

Dated: September 9, 2003



Roger Bernards